IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Kazuhiko YAMANOUCHI   Art Unit :
Serial No.:   Examiner :
Filed   :
Title   : SURFACE ACOUSTIC WAVE SUBSTRATE AND SURFACE ACOUSTIC
           WAVE FUNCTIONAL ELEMENT

Assistant Commissioner for Patents
Washington, DC 20231

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PATENT TRADEMARK OFFICE

PRELIMINARY AMENDMENT

Dear Sir:

Before examining the referenced application on the merits, please amend the application as outlined below:

IN THE CLAIMS

Please amend the claims as follows **[a marked up copy of the amended claims is provided in Appendix A]**:

11.   (Amended) A surface acoustic wave functional element comprising a surface acoustic wave substrate, the surface acoustic wave substrate comprising:

a piezoelectric or electrostrictive substrate having large electromechanical coupling coefficient; and

a thin film formed on said substrate and having variation characteristics of frequency of a surface acoustic wave relative temperature variation opposite to that of said substrate,

wherein said substrate is a $LiNbO_3$ substrate having a cut angle of rotated Y plate

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within a range greater than or equal to -10^0 and smaller than or equal to $+30^0$ and propagating a piezoelectric leaky surface wave having a propagation velocity higher than that of a Rayleigh type surface acoustic wave along X-axis direction or within a range of $\pm5^0$ with respect to X-axis direction, and

a value of H/λ falls within a range from 0.05 to 0.35, where H is the film thickness of said thin film, and λ is the wavelength of operating center frequency of said piezoelectric leaky surface wave,

the element including:

an exciting or receiving region having an interdigital electrode for exciting or receiving the piezoelectric leaky surface wave formed at an interface between the surface of said substrate and said thin film; and

a propagating region having a structure for electrically shorting between said substrate and said thin film or a shorting type grating electrode formed at an interface between the surface of said substrate and said thin film.

14.   (Amended) A surface acoustic wave functional element as set forth in claim 12, wherein the electromechanical coupling coefficient k^2 of said piezoelectric leaky surface wave is greater than or equal to 0.155 in said exciting or receiving region, and the temperature coefficient of frequency as measured at 25°C is in a range from -30 ppm/°C to $+30$ ppm/°C in said propagating region.

Please add new claim 19 as follows:

--19.   A surface acoustic wave functional element as set forth in claim 13, wherein the electromechanical coupling coefficient k^2 of said piezoelectric leaky surface wave is greater than or equal to 0.155 in said exciting or receiving region, and the temperature coefficient of frequency as measured at 25°C is in a range from –30 ppm/°C to +30 ppm/°C in said propagating region.--

REMARKS

The claims have been amended to eliminate multiple dependencies. No new matter has been introduced by way of this amendment. Full and favorable action is requested. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference No. 08440.003001).

Respectfully submitted,

Date: _____

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APPENDIX A – MARKED-UP VERSION OF THE AMENDED CLAIMS

The material to be added is indicated by underlining, while the matter to be deleted is in brackets and in boldface.

11.   (Amended) A surface acoustic wave functional element comprising a surface acoustic wave substrate [as set forth in any one of claims 1 to 10], the surface acoustic wave substrate comprising:

a piezoelectric or electrostrictive substrate having large electromechanical coupling coefficient; and

a thin film formed on said substrate and having variation characteristics of frequency of a surface acoustic wave relative temperature variation opposite to that of said substrate,

wherein said substrate is a $LiNbO_3$ substrate having a cut angle of rotated Y plate within a range greater than or equal to -10^0 and smaller than or equal to $+30^0$ and propagating a piezoelectric leaky surface wave having a propagation velocity higher than that of a Rayleigh type surface acoustic wave along X-axis direction or within a range of $\pm5^0$ with respect to X-axis direction, and

a value of H/λ falls within a range from 0.05 to 0.35, where H is the film thickness of said thin film, and λ is the wavelength of operating center frequency of said piezoelectric leaky surface wave,

the element including:

an exciting or receiving region having an interdigital electrode for exciting or receiving the piezoelectric leaky surface wave formed at an interface between the surface of said substrate and said thin film; and

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a propagating region having a structure for electrically shorting between said substrate and said thin film or a shorting type grating electrode formed at an interface between the surface of said substrate and said thin film.

14.   (Amended) A surface acoustic wave functional element as set forth in claim 12 [or 13], wherein the electromechanical coupling coefficient k^2 of said piezoelectric leaky surface wave is greater than or equal to 0.155 in said exciting or receiving region, and the temperature coefficient of frequency [(TCF)] as measured at 25°C is in a range from −30 ppm/°C to +30 ppm/°C in said propagating region.